Strategic Relationships: Attracting Future Technical Leaders

Presented to The National Academies
Workshop on National Laboratories and Universities: Building New Ways to Work Together

July 10, 2003

Laura R. Gilliom, Ph.D.

Director, University Relations Program

Lawrence Livermore National Laboratory

University Interactions Were Second Nature to the Founding Scientists of Site 200 of the Berkeley Radiation Laboratory

1952 2002

The University Relations Program . . .

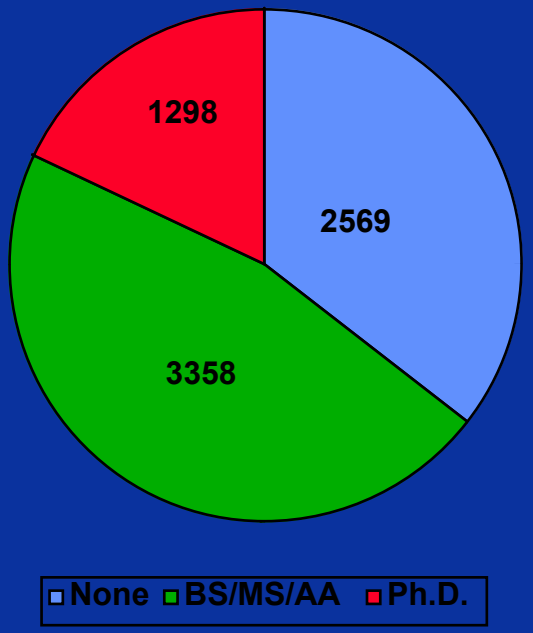
. . . Exists to foster collaborations between LLNL and academic institutions — principally the University of California campuses — that enhance

- S&T Vitality
- Recruiting
- Mission Execution

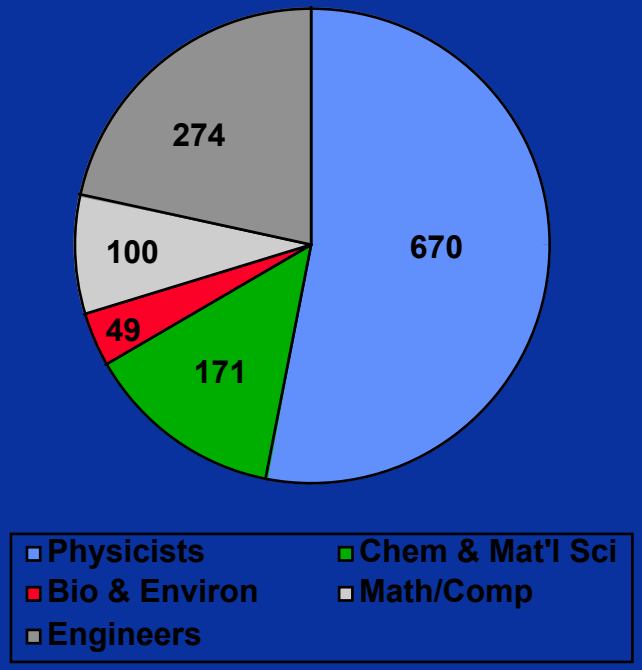
IN BOTH DIRECTIONS

The LLNL Workforce

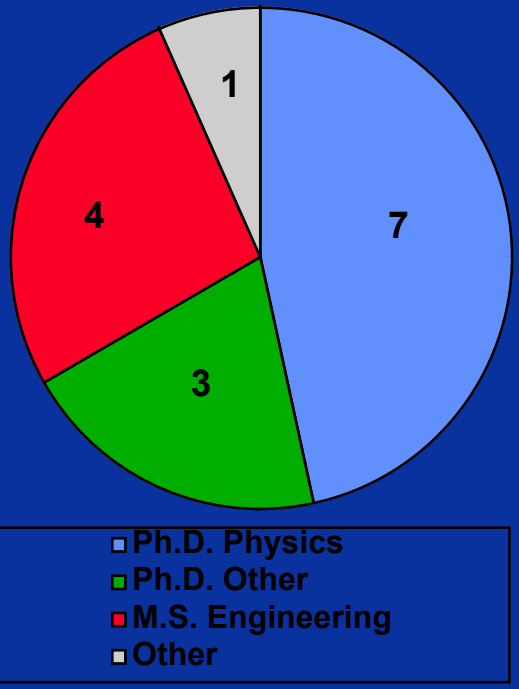
By degree



Ph.D. Staff by discipline



Senior Management by discipline



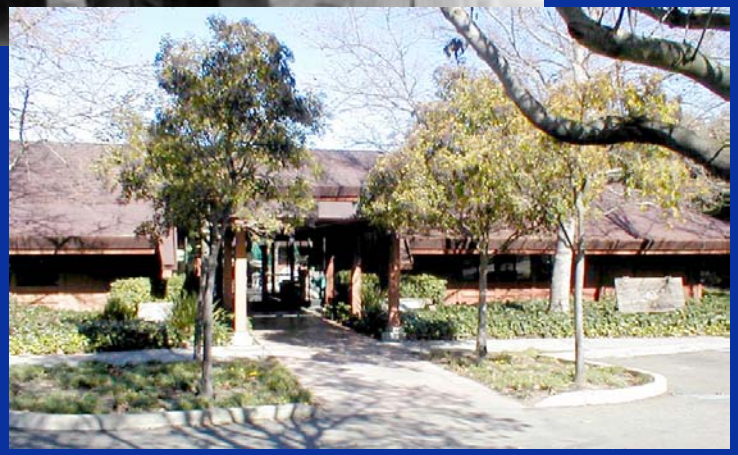
Full Time LLNL Staff = 7225

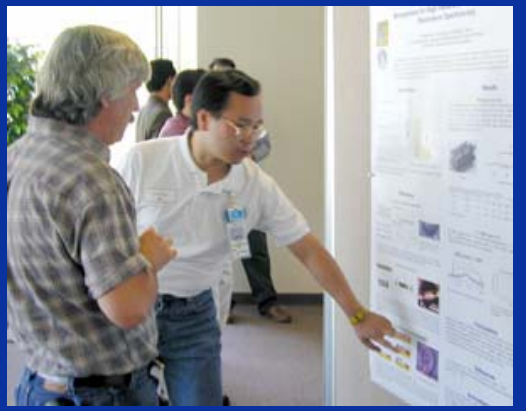
The UC Davis Department of Applied Science (DAS) was established in 1963

1952 2002

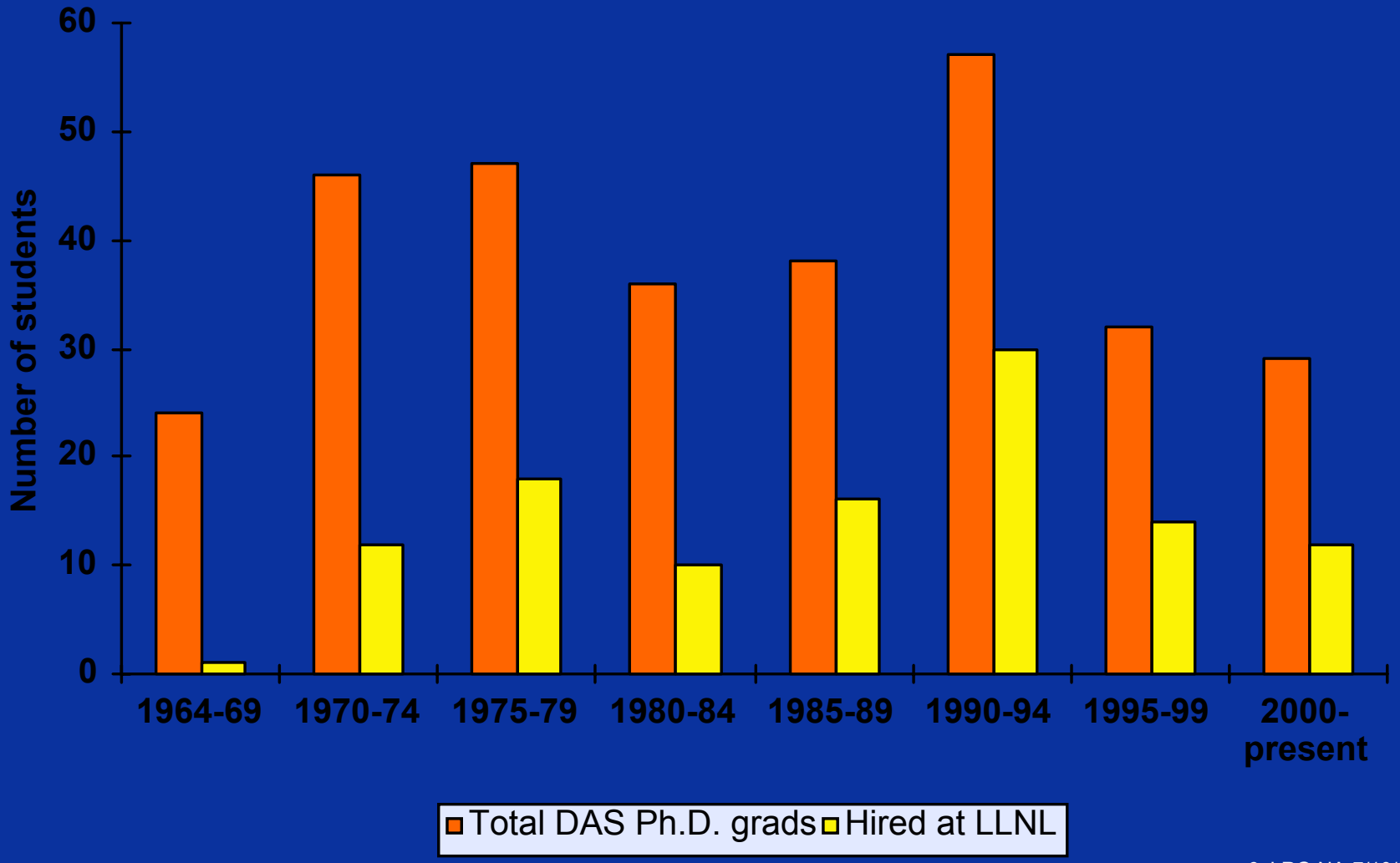
315 DAS Graduates

114 to LLNL





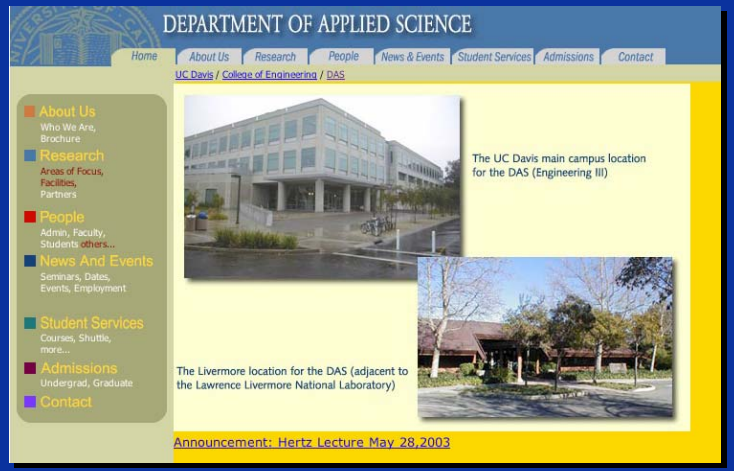
DAS program Ph.D. graduate history



Our Graduate Fellow Program is a Key Element of LLNL's Recruiting Pipeline

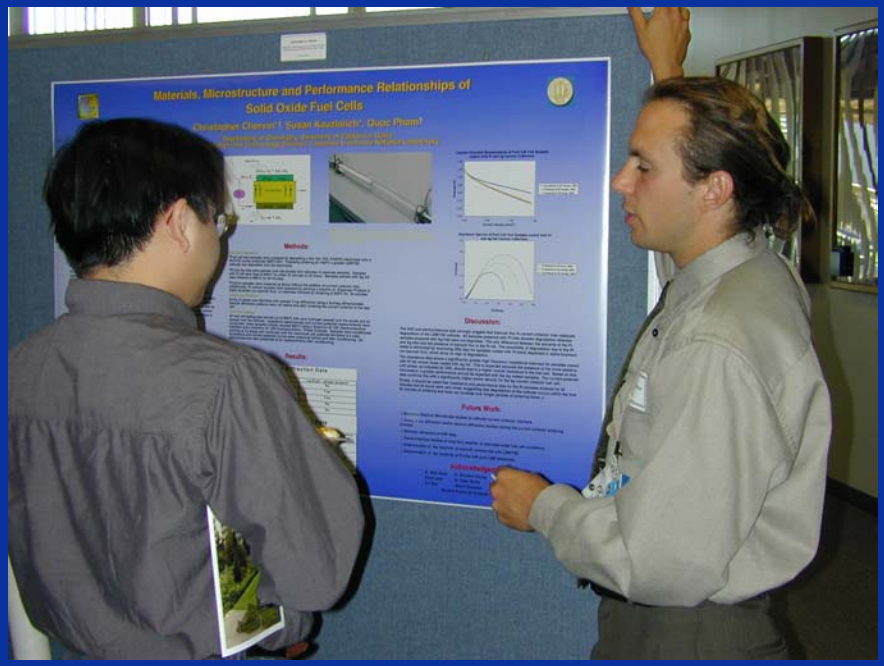
1952 2002

- Prior to 1999: Only DAS
- 1999: Opened to all UC Davis
- 2001: Opened to all UC



Current SEGRF Program Student Mix

• UC Davis	50
• UC Berkeley	7
• UC Los Angeles	1
• UC Riverside	1
• UC San Diego	3
• UC Santa Barbara	3
• UC Santa Cruz	1
Total 2002	66



SEGRF Annual Poster Session–October 2001

Lawrence Postdoctoral Fellows

Luc Machiels

Robert Heeter

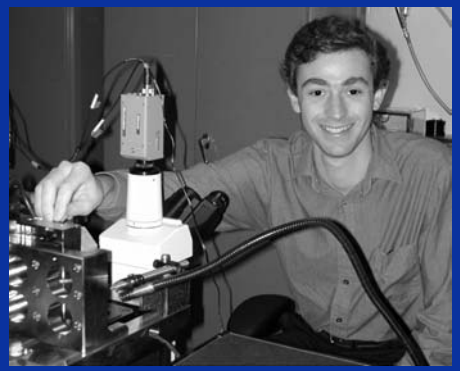
Shea Gardner

Nicolas Hadjiconstantinou

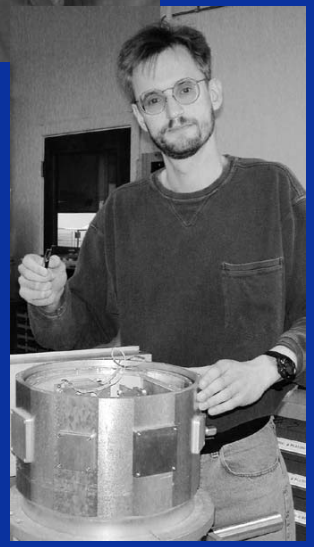
Jeffrey Grossman

Andrew Williamson

Julio Camarero

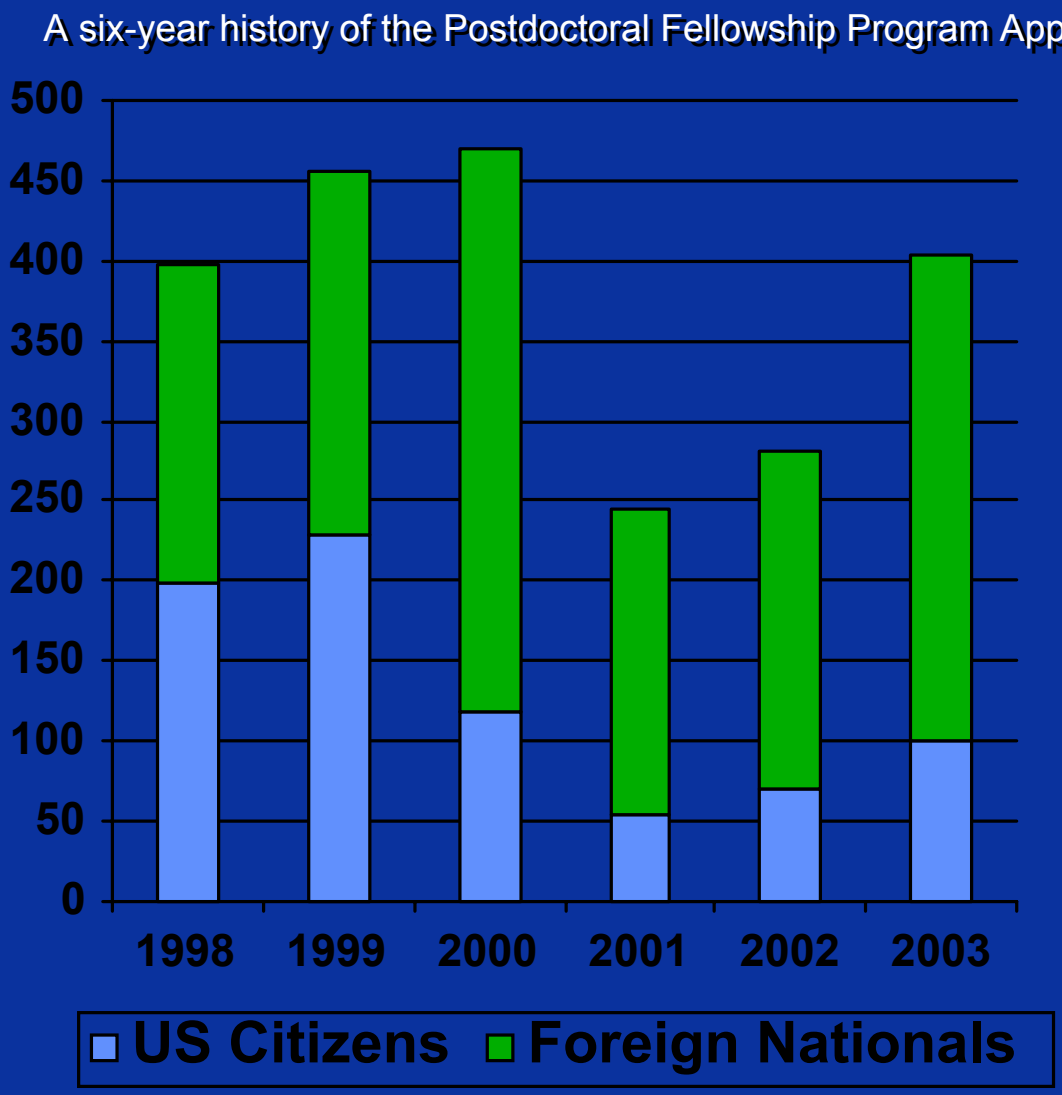


Aleksandr Noy



Joel Ullom

Lawrence Fellows Applicant History

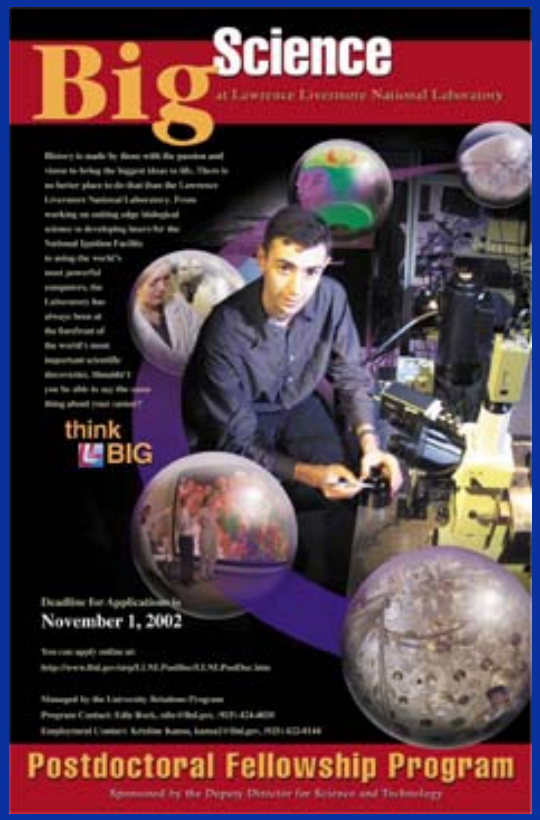


Lawrence Postdoctoral Fellowship Statistics–FY1998-2003

Since 1998 fifteen (15) fellows have been hired into the program.

Of these 15:

6 were…	Converted to career employees
4 have…	Left LLNL (two to MIT professorship)
6 are…	Still fellows. Of these six: –two are scheduled to finish the program early FY04



Strategy

Deliberately and Deeply Embed LLNL as a Strategic Partner Within the University Community

Offer "Best of Both Worlds" Opportunity

IGPP: Institute for Geophysics and Planetary Physics

1952 2002

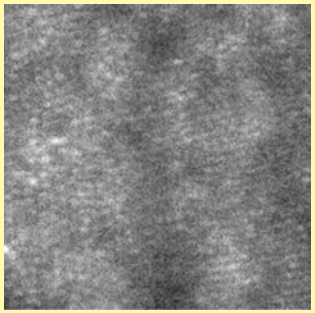
IGPP Hiring Results

- 33 scientists with IGPP association hired by LLNL in term or career positions
  - -Charles Alcock
  - -Kem Cook
  - -Wil Van Bruegel
- 41 scientists with IGPP association went on to faculty positions
- Gives LLNL excellent connections for recruiting students, postdocs

NSF Center for Adaptive Optics

- CFAO is an NSF Science and Technology Center
  - –One of only 5 Centers selected nationally in 1999
- Founded in 1999, lifetime 10 years, funding $40M
  - –Renewal for 2nd 5 years was recommended last month
- Headquarters: UCSC, with nodes at 10 other universities and laboratories
- LLNL was a co-founder and is very strong participant
- Adaptive optics for two applications: astronomy, and looking into the living human eye

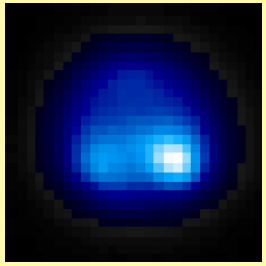
Human vision



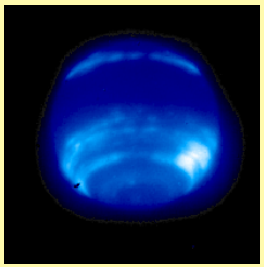
Without AO

With AO: resolve individual cones

Astronomy



Without AO

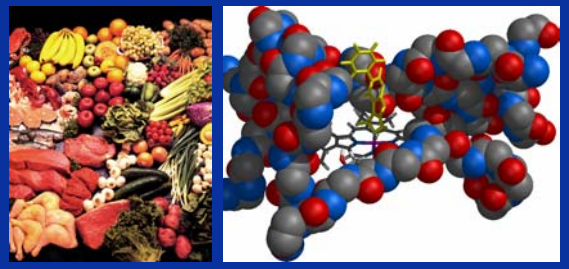


With AO

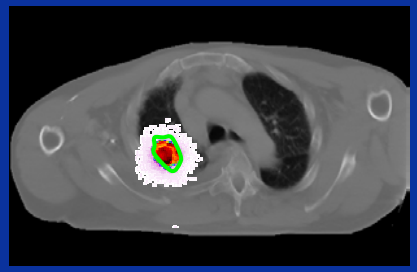
Planet Neptune

LLNL/UCD Integrated Cancer Program

- Designated a National Cancer Center by National Cancer Institute (July 1, 2002)
- This partnership combines the technology and expertise in science and engineering at LLNL with clinical and basic cancer research at UCD.
- 213 researchers total at UCD and LLNL
- Cancer research grants totaling more than $40M



Dietary causes of cancer
BBRP Directorate

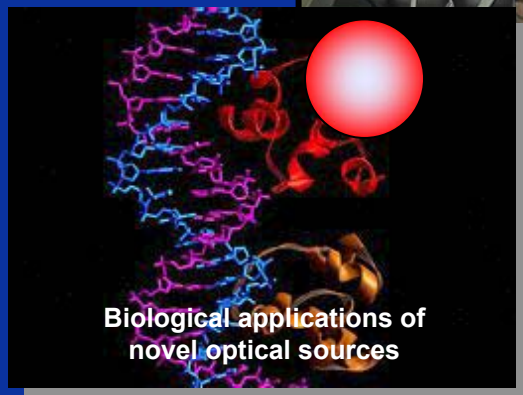


Molecular targeting for radioimmunotherapy
CMS Directorate

Accelerator Mass Spectrometry
EE Directorate

NSF Center for Biophotonics Science and Technology

Laser tissue interaction



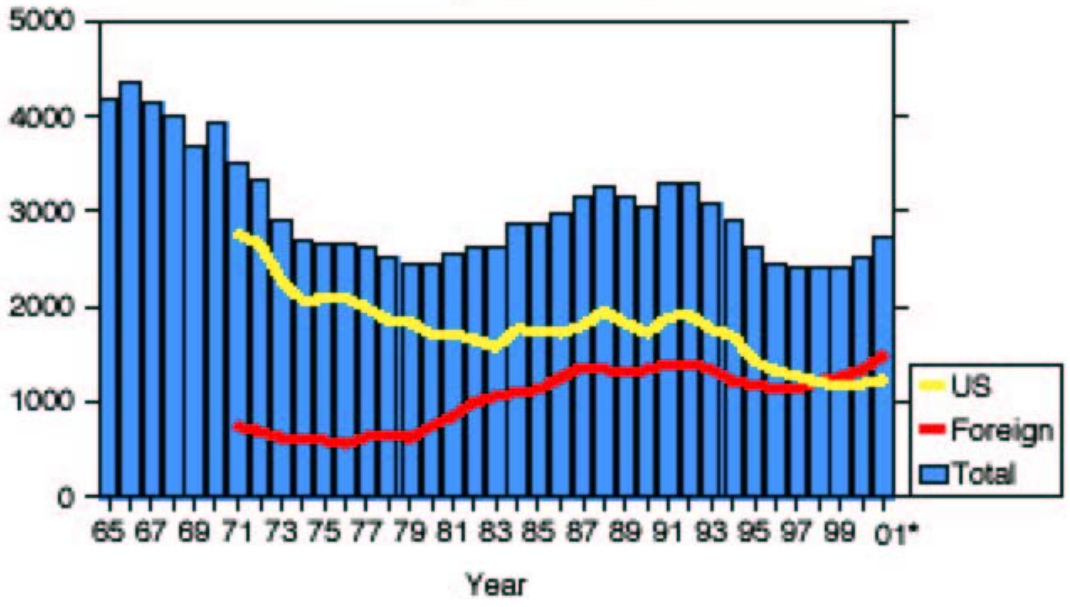
Biological applications of novel optical sources

- An NSF Center headquartered at UC Davis
- 5-year, $20M award renewable for additional five years
- Brings together 90 researchers at 10 institutions (UCD, LLNL, UCB, UCSF, Stanford, Hampton, Fisk, LSU, UTSA, Alabama A&M)
- Participation contributes to LLNL national security missions:
  - promotes valuable scientific collaborations
  - a source of new students and researchers
  - access novel technologies, especially in biothreat agent detection and mitigation

So What's the Problem?

- The changing candidate pool
- SECURITY (and science)
  - Foreign national rules
  - Absence of "white space" at the Lab
- Federal accounting rules
  - Loads costs at Lab vs. universities
  - Mixing of funds forbidden
  - Full cost recovery
- Attack "News"
- Uncertainty:
  - Galvin Report
  - LDRD 6% → 4%
  - UC Contract??
- Washington-led vs. Lab-led workforce efforts

First-year US and foreign graduate physics students, 1965 to 2001



*A change in wording on the 2001 questionnaire resulted in more accurate data on first-year graduate students. This change was responsible for 3% of the reported 8% increase in total first-year students between 2000 and 2001.

Source: AIP Statistical Research Center, Enrollments and Degrees Report.

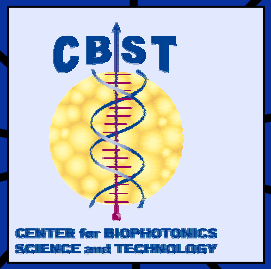
Bottom Line

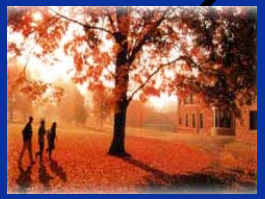
Two Factors are Key to Successful Hiring:

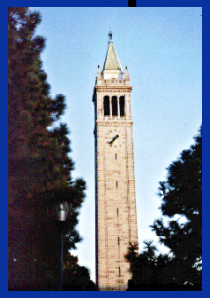
- Residency at the Lab
- Opportunities to do Great Science

BACK UP SLIDES!!!

The CBST has participants from nine academic institutions and LLNL

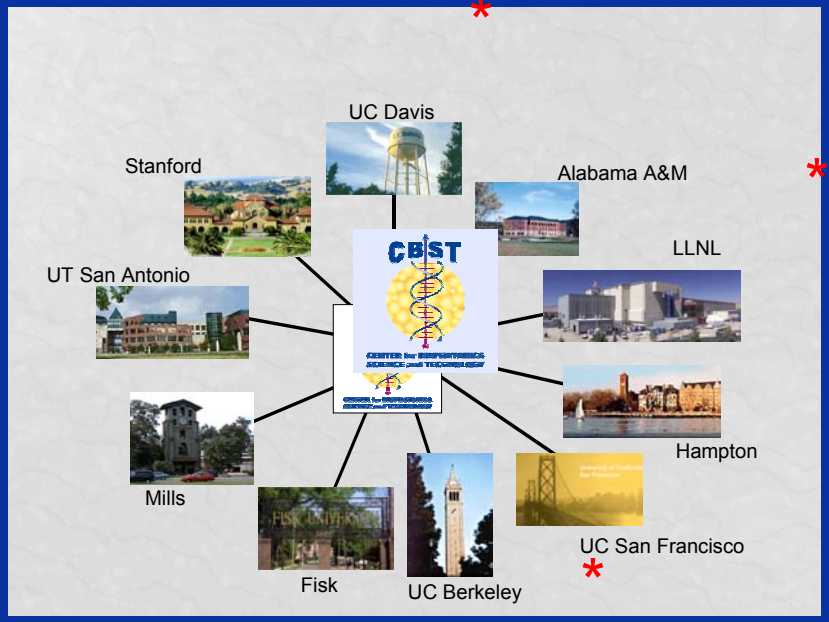






National Science Foundation Center for Biophotonics Science & Technology

- *Biophotonics is the use of light and other forms of electromagnetic radiation in the fields of biology and medicine to perform fundamental and applied research and to develop new high-value technologies.*
- *The Center for Biophotonics is dedicated to excellence in research, a multidisciplinary and team approach to science, science and mathematics education at all grade levels, and engendering diversity.*
- *It received from NSF and its partners a renewable 5 year $26M award which supports 90 researchers at 10 institutions including LLNL, UCD, UCB, UCSF, and Stanford*
- *Participation in the CBST is consistent with the LLNL's mission to applying science and technology to the important problems of our time, promotes valuable scientific collaborations and acting as a source of new students, researchers, and novel technologies especially in the areas of molecular imaging, biosensors, computer simulations*



* Center includes three UC Campuses and LLNL

biosecurity

portable pathogen detector

computational biophotonics

LLNL ASCI WHITE computer

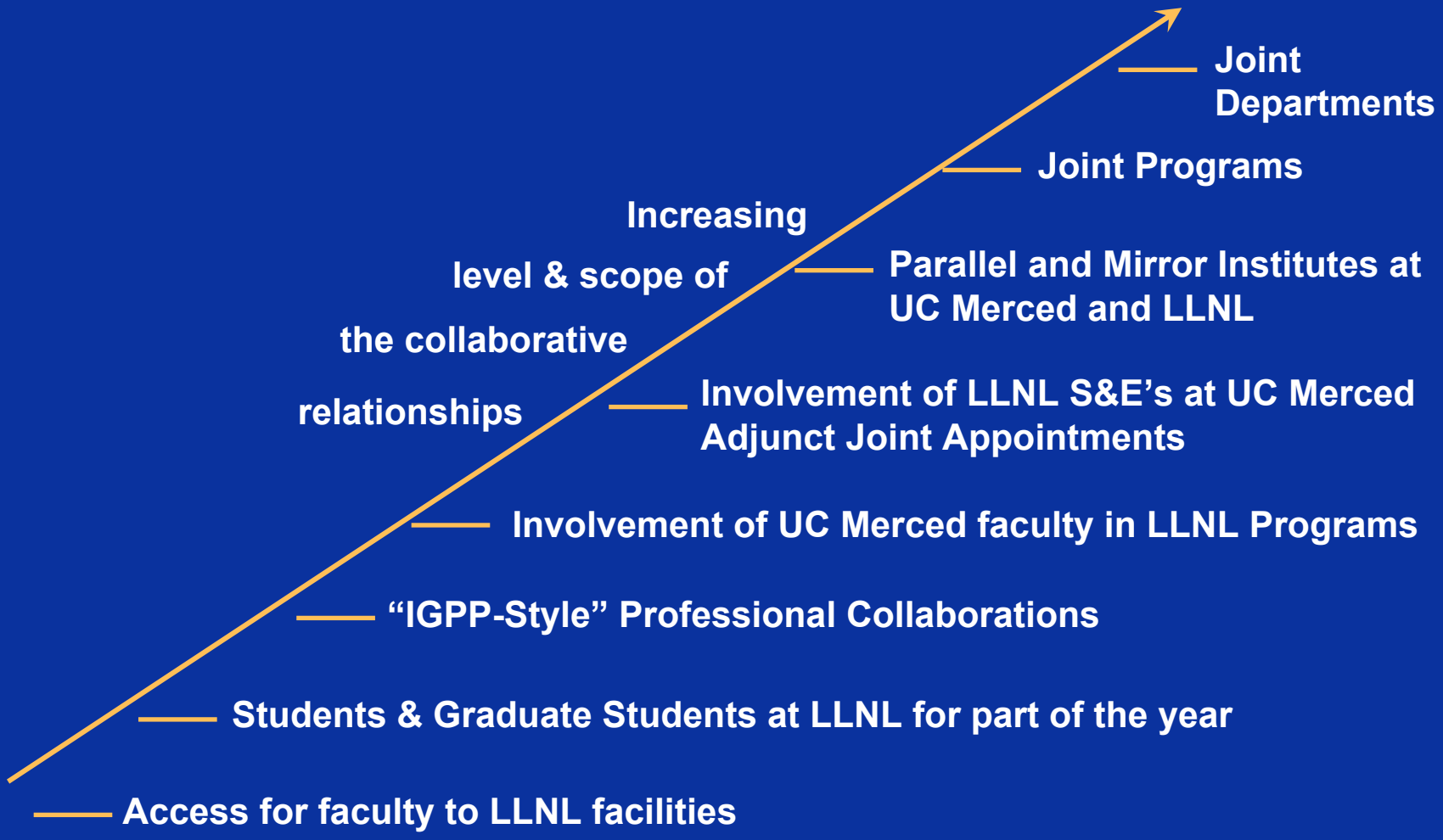
bioimaging

x-ray laser image of rat sperm

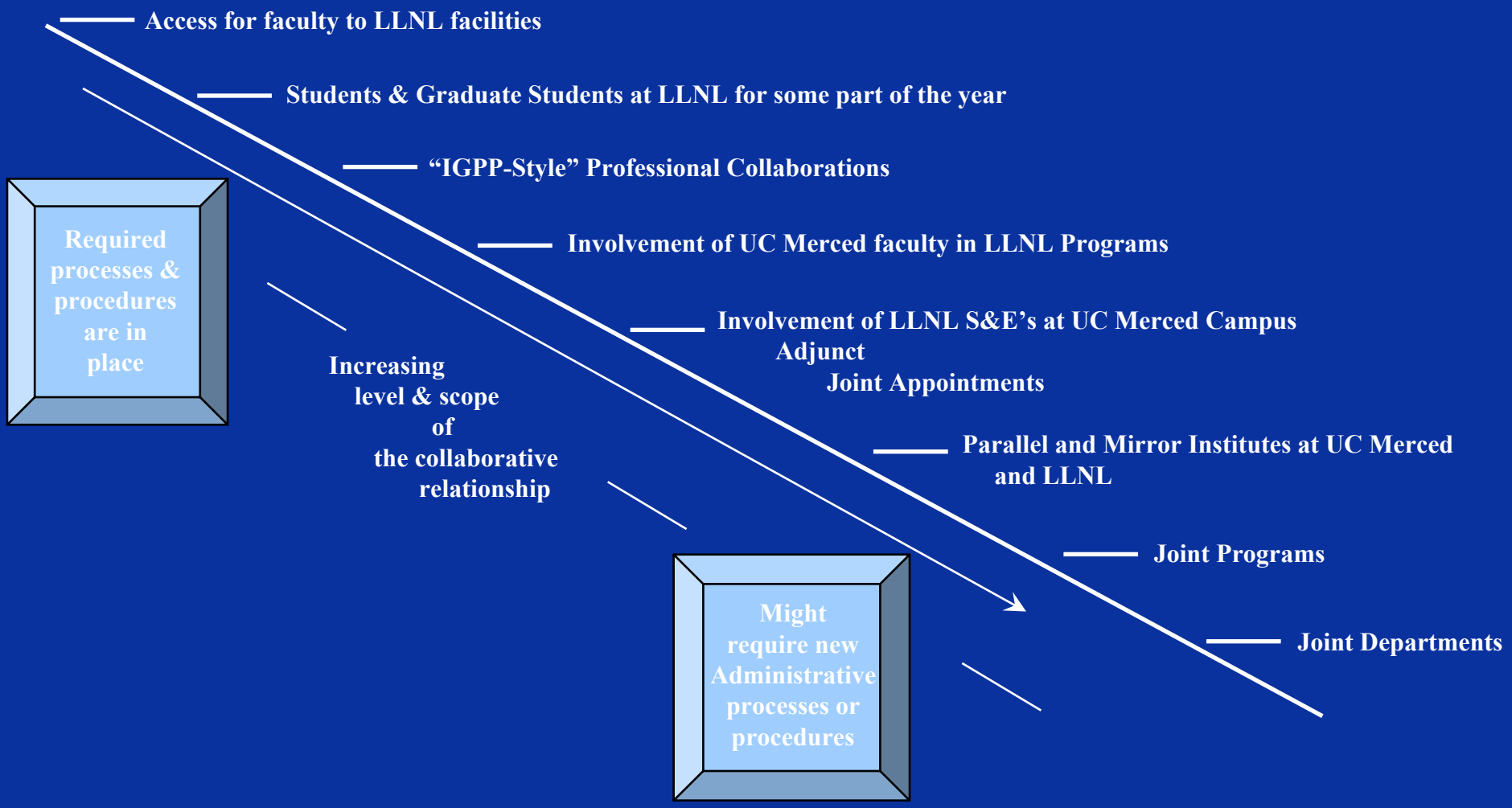
biomaterials

medical devices from photoactivated shape memory polymers

UC Merced and LLNL spectrum of potential collaborative relationships



A spectrum of potential collaborative relationships are being discussed between UC Merced and LLNL



Faculty-like Opportunities Are an Attractive Feature of the UC Relationship

- Multi-location Appointments – Currently 19
- Joint Appointments – Currently 6
- Adjunct Appointments – Currently 28, 19 at UC campuses

Offer "Best of Both Worlds" Opportunity

Consider the Possibilities…

LLNL Summer Student	→	UC Graduate Student
UC Undergraduate	→	UC/LLNL SEGRF Student
UC Graduate Student	→	LLNL Postdoc
UC/LLNL SEGRF Student	→	UC Postdoc
LLNL Postdoc	→	UC Assistant Professor
UC Postdoc	→	LLNL Technical Staff

How should we strengthen these pipelines?

LLNL Research Collaborations Program for HBCUs and MIs

Twenty Eight technical collaborations involving Professors, Post-Docs, Graduate Students and Undergraduates from sixteen Historically Black Colleges and Universities and other Minority Institutions.

The collaborations span a wide range of topics such as nonlinear optics, atomic physics, materials science, spectroscopy, plasma diagnostics and massively parallel computing.

Student participate in research at their home campuses in the academic year as well as at LLNL during the summer.

About fifteen refereed publications annually - most with HBCU & MI professors and students as co-authors with LLNL scientists.

Successful joint proposals have been funded by DOE, NASA, and NSF

Partnered with NSF Science and Technology Centers at UC Davis (CBST) and UC Santa Cruz (CfAO)

About 35 undergraduate participants have advanced to graduate school in physical science disciplines.

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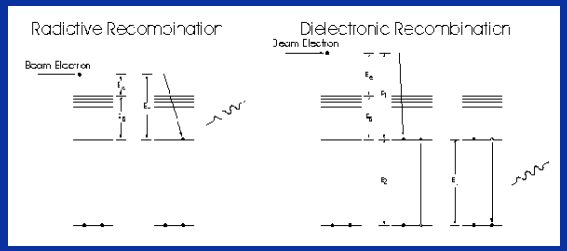
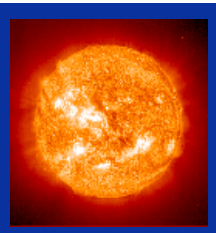
RCP Collaborations Supported by NASA Grants

Cryrogenic X-ray and Gamma Ray Detectors
South Carolina State University
($735,000 over 3 year period)
LLNL PI - Simon Labov (V-division)

Atomic Collisions in Astrophysical Plasmas
Florida A&M University
($675,000 over 3 year period)
LLNL PI - Peter Beiersdorfer (V-division)



Effects of Solar Fluctuations on Atmosphere
Alabama A&M University
($675,00 over 3 years period)
LLNL PI - Bala Govindasamy (Atmospheric Research Division)



Two Week Workshop on Astrophysical Spectra held at LLNL

- Eight graduate students and upper-level undergraduates
- Daily lectures and seminars by LLNL scientists
- Students use EBIT Laboratory Astrophysics Facility to produce and measure spectra
- Tours of relevant LLNL facilities
- Special Tour of Lick Observatory

Hampton University Collaboration with LLNL and Center for Adaptive Optics at UC Santa Cruz

Sodium laser creates a "virtual" star, to guide high resolution adaptive optics for Keck Telescope

Fiber Optics Sensors and Devices Group Working on Bragg Wavemeter at Hampton

The Hampton Fiber Optics Sensors and Devices Group is collaborating with LLNL on research to develop Fiber Optic Lasers for Laser Guide Star Systems. The Hampton group is developing techniques to suppress undesirable ASE in the fiber optic lasers.

LLNL Research Collaborations Program for HBCUs and MIs

Kennedy Reed earned a B.S. at Monmouth College in Illinois, and a Ph.D. in physics at University of Nebraska. He is a theoretical physicist at Lawrence Livermore National Laboratory, working in research on atomic collisions in high temperature plasmas. He is also director of the LLNL Research Collaborations Program for HBCUs & MIs, which is within the Laboratory's University Relations Program.

Dr. Reed is a Fellow of the American Physical Society; Charter Fellow, National Society of Black Physicists (NSBP); member, Optical Society of America; and member, American Association for the Advancement of Science.

He has been a visiting scientist at the Hahn Meitner Institute in Germany; at University College London in England; at University of Dakar in Senegal; and at University of Cape Coast in Ghana. He has been active in programs of the International Center for Theoretical Physics in Trieste, Italy; has served as Vice Chair of the APS Committee on International Scientific Affairs; and is on the International Union of Pure and Applied Physics: Commission on Physics for Development.

A leader in national efforts to increase minority participation in physics, Dr. Reed has been President of NSBP; Chair, APS Bouchet Prize Committee; member, APS Committee on Minorities in Physics; a co-founder of the National Physical Science Consortium Graduate Fellowship Program; and a Physics Professor at Morehouse College.

Recipient of the 2003
American Physical Society
JOHN WHEATLEY AWARD
In Recognition Of
Contributions to the Promotion of Physics Research and Education in Africa.

NNSA Academic "Programs"

ASCI Alliances

- No UC Level I Partnerships
- Money constantly at risk
- How well are we harvesting? ROI?

Stockpile Stewardship Academic Alliances Program

- Mismatch between expectations and funding reality
- Key UC partners not funded

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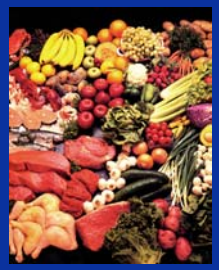

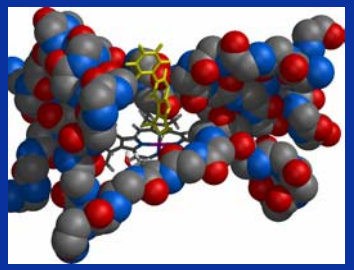

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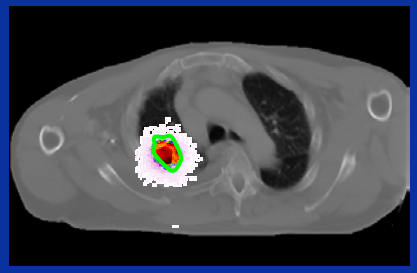

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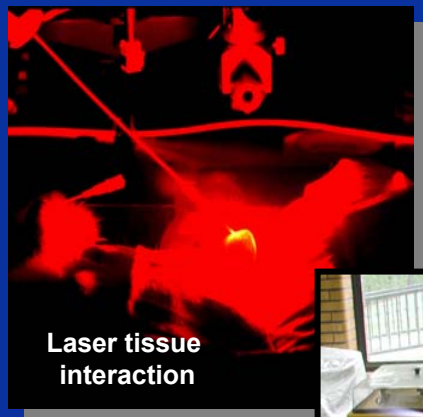
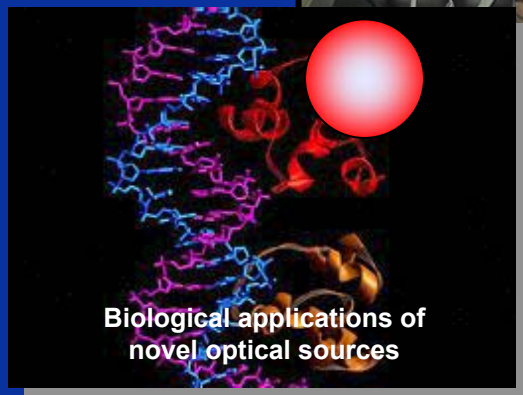


Laser tissue interaction



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What about Homeland Security?

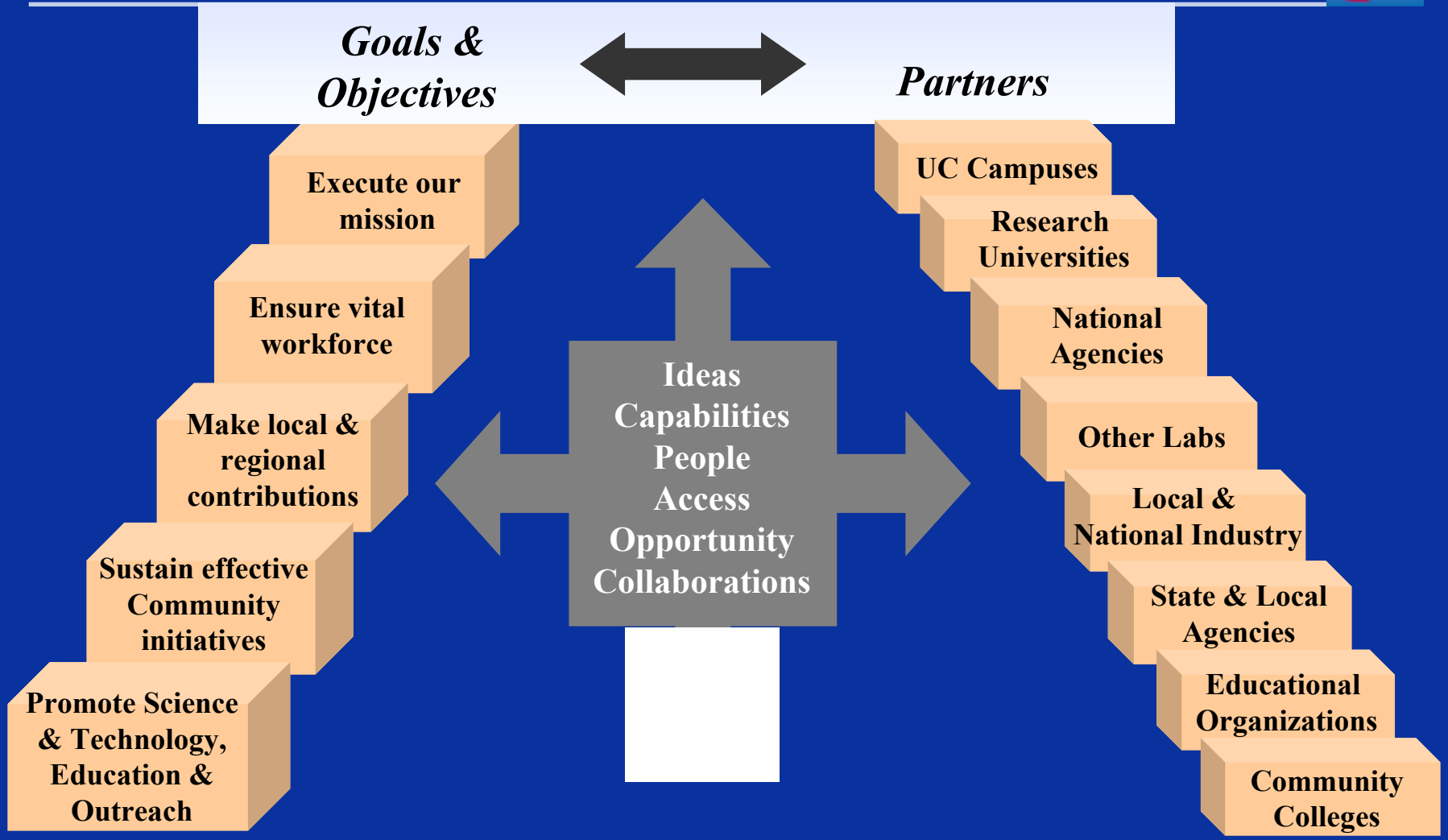
UC Berkeley Faculty Study Group

UC President's Committee Study Group

NAS Workshop

It would be nice to see a coherent UC-system strategy emerge……..

Collaborations and Partnerships with Industry and Academia are Useful for Many Reasons



LLNL collaborates with broad range of academic institutions